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PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Clay L. Davidson
Application No.: 09/659,125
Filed: September 11, 2000
For: WATERMARK ENCODING AND DECODING IN IMAGE DEVICES AND IMAGING DEVICE INTERFACES
Examiner: Patrick L. Edwards
Date: January 18, 2005

Art Unit 2621
Confirmation No. 4337

CERTIFICATE OF MAILING

I hereby certify that this paper and the documents referred to as being attached or enclosed herewith are being deposited with the United States Postal Service on January 18, 2005 as First Class Mail in an envelope addressed to: MAIL STOP APPEAL BRIEF – PATENTS, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450.

William Y. Conwell
Attorney for Applicant

TRANSMITTAL LETTER

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Enclosed for filing in the above-captioned matter are the following:

☒ Appeal Brief (fee **$500.00**)

☒ Applicant petitions for a one month extension of time from December 29, 2004 to January 29, 2005 (fee **$120.00**). If a further extension of time is required, please consider this a petition therefor.

☒ Please charge **$620.00** (fee for Appeal Brief and extension of time) and any additional fees which may be required in connection with filing this document and any extension of time fee, or credit any overpayment, to Deposit Account No. 50-3283.

Respectfully submitted,

Date: January 28, 2005

DIGIMARC CORPORATION

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Attorney for Applicant

APPEAL BRIEF

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Alexandria, VA 22313-1450

Sir:

This brief is in furtherance of the Notice of Appeal filed October 29, 2004. Please charge the fee required under 37 CFR 1.17(f), and the extension of time fee, and any other fee or deficiency, to deposit account 50-3283 (see transmittal letter).

02/03/2005 MAHMED1 00000024 503283 09659125
01 FC:1402 500.00 DA

I. REAL PARTY IN INTEREST

The real party in interest is Digimarc Corporation, by an assignment from the inventor recorded at Reel 11426, Frames 628-629, on December 27, 2000.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 3-15, 18 and 19 stand finally rejected and are appealed.

IV. STATUS OF AMENDMENTS

As of the filing of this Brief, applicants have not received any Office response to the Amendment After Final filed October 29, 2004.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to digital watermark encoding and decoding in imaging devices (such as printers and scanners), and in imaging device interfaces.[1]

Digital watermarking is the science of information hiding. It encompasses a great variety of techniques by which, *e.g.*, plural bits of digital data can be hidden in some other object, without leaving human-apparent evidence of alteration or data representation.[2] Thus, an image on a banknote or other value document can be watermarked to convey machine readable data

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1 *See, e.g.*, specification, page 2, lines 13-14.
2 *See, e.g.*, specification, page 1, lines 19-26.

identifying the document as a banknote.[3] Or a watermark can include metadata (or a reference to metadata in a remote store) corresponding to an image. Such digital watermarks can be detected and acted-upon by appropriate decoder systems, but are not generally perceptible to a human viewer of the image.[4]

(Digital watermarks may be contrasted with traditional, paper watermarks. The *Encyclopedia Britannica* (on-line) defines a watermark as a "design produced by creating a variation in the thickness of paper fibre during the wet-paper phase of papermaking." The *Britannica* goes on to note, "Watermarks are often used commercially to identify the manufacturer or the grade of paper. They have also been used to detect and prevent counterfeiting and forgery." The on-line encyclopedia *Wikipedia* defines a watermark as "a recognizable image or pattern in paper that appears lighter when viewed by transmitted light (or darker when viewed by reflected light, atop a dark background)." It goes on to explain, "A watermark is made by impressing a water coated metal stamp or dandy roll onto the paper during manufacturing. Watermarks were first introduced in Bologna, Italy in 1282; they have been used by papermakers to identify their product, and also on postage stamps, currency, and other government documents to discourage counterfeiting." The watermarks with which the present invention are concerned are not traditional watermarks, but digital watermarks. Such technology is detailed, *e.g.*, in patent 5,862,260 and application 09/503,881 (now patent 6,614,914) that are incorporated by reference in the present specification.[5])

In one particular scenario detailed in the present application, digital watermark technology is used for inhibiting the counterfeiting of banknotes. In such an arrangement, detection of a banknote-identifying digital watermark serves to trigger interruption of a printing or scanning process.[6] Desirably, the interruption occurs before the banknote is fully printed (or scanned).[7] A "streaming mode" detector is employed for this purpose, which analyzes a stream

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3 *See, e.g.*, specification, page 2, lines 24-25.
4 *See, e.g.*, specification, page 1, lines 20-21; page 2, lines 24-26.
5 Specification, page 1, lines 10-12.
6 *See, e.g.*, specification, page 2, lines 24-26.
7 *See, e.g.*, specification, page 5, lines 3-14; page 15, lines 12-13.

of image data passing between system components – rather than waiting for the complete image to be available for processing.[8]

In addition to identifying an image as a banknote (or other value document), a digital watermark alternatively can encode metadata (or a reference to metadata in a remote store) related to an image.[9] This metadata can be used, *e.g.*, during rendering the image.[10] For example, the watermark in an image can comprise a URL of a related web page. When detected by the watermark decoder, the web page can be fetched and rendered.[11]

According to independent claim 3, one aspect of the invention is a method for decoding a digital watermark from an image in a printing or scanning process.[12] Portions of an image are intercepted as they pass from one stage of the printing (or scanning) process to another.[13] A watermark decoding operation is performed on at least certain image portions.[14] A result of the decoding operation is provided before the printing (or scanning) process had completed for the image.[15] This decoding operation is performed in a driver executing in a computer as the image is being passed between an application program and a printer (or scanner) through the driver.[16]

Independent claim 6 is similar, *e.g.*, comprising a method for decoding a digital watermark in a printing or scanning process, including intercepting portions of an image as they pass from one stage to another, and providing a watermark decoding result before the printing (or scanning) process has completed. The method of claim 6 further requires that the watermark decoding is operable to decode a watermark that has been embedded redundantly in the image and varies in the image.[17] Additionally, claim 6 requires that the portions are buffered,[18] and analyzed to select blocks for watermark detection operations.[19]

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8 *See, e.g.*, specification, page 2, lines 17-21.
9 *See, e.g.*, specification, page 2, lines 26-29.
10 *Id. See also, e.g.*, specification, page 3, lines 1-4.
11 *See, e.g.*, specification, page 15, lines 19-25.
12 *See, e.g.*, Fig. 1.
13 *See, e.g.*, specification, page 5, lines 14-17.
14 *See, e.g.*, specification, page 5, lines 17-20.
15 *See, e.g.*, specification, page 5, lines 3-14; page 15, lines 12-13.
16 *See, e.g.*, specification, page 2, lines 19-23; page 3, lines 22-24; page 4, lines 11-13.
17 *See, e.g.*, specification, page 5, line 29 to page 6, line 1; page 6, lines 26-29.
18 *See, e.g.*, specification, page 5, lines 16-17.
19 Some portions (blocks) are more likely to have readable watermark data than others; *see, e.g.*, specification, page 6, lines 19-29.

Independent claim 10 is also similar, *e.g.*, comprising a method for decoding a digital watermark in a printing or scanning process, including intercepting portions of an image as they pass from one stage to another, and providing a watermark decoding result before the printing (or scanning) process has completed. The method of claim 10 further requires that a result of the watermark decoding be used to trigger a responsive action before printing (or scanning) of the image is complete.[20]

Another aspect of the invention (independent claim 13) is an imaging system that comprises a device for scanning or printing and image, and a digital watermark decoder. The watermark decoder intercepts portions of an image as they pass from one stage to another,[21] and performs a watermark decoding operation on at least certain of the intercepted portions.[22] As in the previous arrangements, a result of the watermark decoding operation is provided before the printing or scanning process has completed.[23] The watermark decoder selects blocks for watermark decoding based on an analysis of characteristics of the blocks – indicating which blocks are likely to have a recoverable watermark signal.[24]

A further aspect of the invention (independent claim 18) is a method of image watermark *encoding* in a printing process. (All previous claims relate to watermark *decoding*.) The method includes intercepting portions of an image as they pass from one stage of a printing process to another, and watermarking at least some of those portions.[25] The method is further characterized in that the watermarking encodes "tracer data" into the image being printed.[26] (Tracer data can be, *e.g.*, information identifying the date, user, computer, etc.) This tracer data is encoded into the image in response to detecting a digital watermark in the image (*e.g.*, a watermark identifying the image as a banknote).[27]

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[20] For example, printing scan be stopped, or a notice can be provided to the user via a graphical user interface or audio output. *See, e.g.*, specification, page 15, lines 8-13.

[21] *See, e.g.*, specification, page 5, lines 14-17.

[22] *See, e.g.*, specification, page 5, lines 17-20.

[23] *See, e.g.*, specification, page 5, lines 3-14; page 15, lines 12-13.

[24] *See, e.g.*, specification, page 6, lines 19-29.

[25] *See, e.g.*, specification, page 3, lines 5-11; page 11, lines 25-29.

[26] *See, e.g.*, specification, page 3, lines 12-17; page 14, line 27 to page 15, line 5.

[27] *See, e.g.*, specification, page 15, lines 6-7.

Still another aspect of the invention (independent claim 19) is similar: a method of image watermark encoding in a printing process, including intercepting portions of an image as they pass between stages of a printing process, and watermarking at least some of those portions. The method of claim 19 is further characterized in that the watermarking encodes "calibration data" into the image.[28] This calibration data serves to facilitate subsequent detection of a watermark in a geometrically distorted version of the watermarked image.[29]

VI. GROUNDS OF REJECTION

Claims 13-15 stand rejected as anticipated by Suzuki (5,621,810).

Claim 19 stands rejected as anticipated by Ratnakar (6,556,688).

Claims 3 and 10 stand rejected as obvious over Suzuki in view of Conley (5,689,626).

Claims 4 and 5 stand rejected as obvious over Suzuki and Conley, and further in view of Tillery (6,032,201.

Claims 6, 8, 9, and 12 stand rejected as obvious over Suzuki in view of Kofune (5,483,069).

Claim 11 stands rejected as obvious over Suzuki in view of Kofune, and further in view of Rhoads (WO 97/43736).

Claim 18 stands rejected as obvious over Ratnakar in view of Stefik (5,629,980).

Claim 7 stands rejected under 35 USC § 112, ¶ 1.

(Claim 4 was objected-to under 35 USC § 112, ¶ 2 (lack of antecedent basis) but this objection is believed to have been overcome by the Amendment After Final.)

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28 *See, e.g.*, specification, page 10, lines 3-5.

29 *See, e.g.*, specification, page 10, lines 11-13.

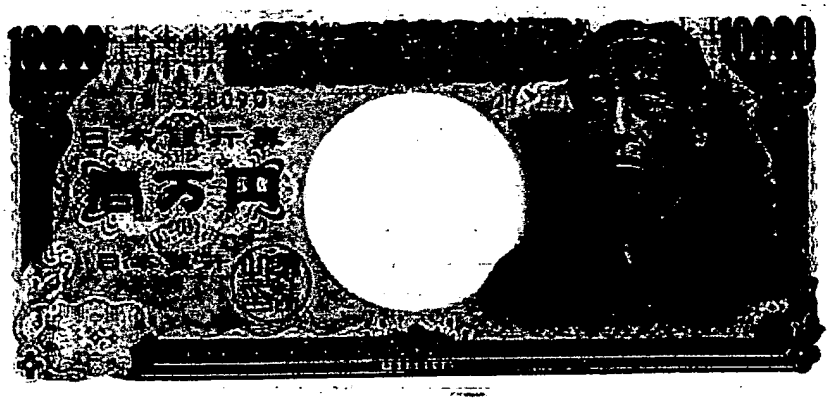
VII. ARGUMENT

The Final Rejection has misconstrued the primary reference, Suzuki 5,216,724. Whereas the invention concerns *digital* watermark technology,[30] Suzuki involves a traditional *paper* watermark.

Suzuki's invention is concerned with recognizing banknotes by reference to visible, localized patterns thereon - in particular, the red Bank of Japan seal found on the front and back of the Japanese 10,000 Yen note. This pattern – characteristic of a banknote – is found by a process that locates the seal by looking in expected positions relative to a circular central region where a paper watermark is found.

As just-mentioned, Suzuki's aim is to recognize banknotes (col. 1, lines 63-67). He does this by checking a scanned document for a particular pattern that is uniquely present on banknotes, and distinguishes them from other documents. The banknote particularly considered by Suzuki is the 10,000 Yen banknote.

Suzuki depicts the 10,000 Yen banknote, in gross form, in his Fig. 1. A more accurate rendition is presented below:



30 *See, e.g.*, the sentence characterizing the Technical Field of the invention, at page 1, line 15: "*The invention relates to digital watermarking technology...*"

The central blank region is where the *conventional, paper, watermark* is formed in the banknote paper. The back of the note is similarly un-printed in this center region:

Attention is drawn to the Bank of Japan "red" seal found on both the front (the red pattern left of and lower from central blank region) and back (the red pattern below the tail of the right, sitting bird) of the note. This is the pattern used by Suzuki to uniquely identify a banknote, and distinguish it from other documents (col. 9, lines 39-41). A digital counterpart to this pattern is stored as a reference template by Suzuki, and is used in a pattern matching procedure to determine whether a scanned document has this pattern, and is thus a banknote.

Rather than search all over the scanned document for this pattern, Suzuki speeds his system's operation by identifying four small areas where the pattern (seal) might be found. These are the small dashed rectangles in Suzuki's Fig. 1(an excerpt of which is reproduced below). A banknote scanned at the orientation depicted in Fig. 1 will have the seal appear at one of these four locations, depending on whether the front or back of the note is scanned, and whether the note is upside-down, or rightside-up.

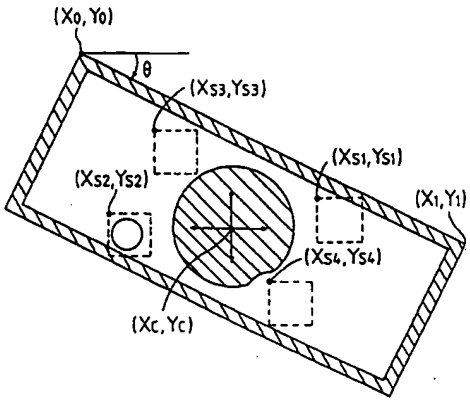


Figure 1 of Suzuki (Excerpt)

Some of Suzuki's specification talks about the convention, paper, watermark. As noted, the watermark is the blank, circular region at the center of the banknote. In Suzuki's Fig. 1, the watermark area is denoted by cross-hatching. (Col. 8, lines 5-8).

Suzuki uses the location of the watermark – together with the angular orientation of the scanned document, to identify the four areas where that should be checked for the characteristic (seal) pattern. This is Suzuki's only use of the watermark – as a locating tool to help find the red seal.

More particularly, Suzuki locates the four candidate positions where the red Bank of Japan seal may occur in a two step process. In the first step, Suzuki determines the position and orientation of the paper document on the photocopier platen, *e.g.*, by sensing the straight edges associated with the edge of the document. By this procedure, any angular skew and offset of the document is determined. (See, *e.g.*, Suzuki Fig. 1, which shows the determined skew as angle θ, and the determined position by coordinates (X_C, Y_C) at the center of the imaged document, which is also the center of the watermark region.)

In the second step, given the position of skew angle and the position of the watermark, Suzuki looks for the characteristic pattern associated with banknotes, *i.e.*, the red seal. This pattern is expected to occur at one of four known locations within the document, as indicated by regions (X_{S1},Y_{S1}), (X_{S2},Y_{S2}), (X_{S3},Y_{S3}), (X_{S4},Y_{S4}) in Fig. 1.

If the Bank of Japan seal (the "reference pattern") is found within any of the four expected locations, then the original document on the photocopier platen is assumed to be a banknote, and counterfeit deterrent action is taken.

In sum, Suzuki teaches that a characteristic printed pattern (the Bank of Japan seal) is used to identify the scanned object as a banknote (col. 9, lines 39-41). Digital watermark data is not decoded, or otherwise used to identify the object as a banknote – rather, a circular blank area where a *traditional, paper* watermark is found, is used as a locating device to help locate the Bank of Japan seal.

In the discussion that follows, applicants first address the claim rejections based on Suzuki (first anticipation, then obviousness). Then the rejections premised on Ratnakar are considered.

1. Claim 13 (§ 102: Suzuki)

Claim 13 is an independent system claim drawn to an imaging system with a "digital watermark decoder":

> *13. An imaging system comprising:*
> *a device for scanning or printing an image;*
> *a digital watermark decoder in communication with said device for intercepting portions of an image as the portions pass from one stage of a printing or scanning process to another, for performing a watermark decoding operation on at least certain of said portions; and for providing a result of the decoding operation before the printing or scanning process has completed, the decoder including a manager for selecting blocks for watermark decoding based on an analysis of characteristics of the blocks indicating which blocks are likely to have a recoverable watermark signal.*

The Final rejection of claim 13 states, "Suzuki et al disclose ... a digital watermark decoder..."[31] This is incorrect.

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[31] July 28, 2004, Final Rejection, page 7, lines 3-5.

As explained above, and contrary to the just-quoted statement, Suzuki has no teaching concerning a "digital watermark decoder." Rather, Suzuki finds a vacant circular region at the center of a Japanese banknote (where a traditional, paper watermark resides) and – by reference to the position of this vacant area – finds four candidate locations where a Bank of Japan seal may be found.

Since Suzuki does not teach that for which it is cited, the anticipation rejection of claim 13 should be reversed.

Moreover, claim 13 further requires that the digital watermark decoder include:

> *a manager for selecting blocks for watermark decoding based on an analysis of characteristics of the blocks indicating which blocks are likely to have a recoverable watermark signal*

Suzuki does not have this element either. In trying to stretch Suzuki to meet this limitation, the Examiner equates the red stamp pattern with the claimed "watermark":

> *The reference describes that the areas are stored in RAM 412 by the CPU and then scanned with a window of 2x2 pixels to determine blocks of black pixels and then perform pattern matching to determine if the block contains* ***the red stamp*** *(****i.e.,*** *analyze characteristics of the blocks to indicate which blocks have* ***the watermark****.*[32]

Again, since Suzuki does not teach that for which it is cited, the anticipation rejection of claim 13 should be reversed.

In view of the foregoing failings, other points that might be made concerning the claim and the art are not belabored.

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[32] July 28, 2004, Final Rejection, page 8, lines 3-7; emphasis added; parentheticals omitted.

2. **Claim 14 (§ 102: Suzuki)**

Claim 14 depends from claim 13 and is similarly allowable. Claim 14 is also patentable independently of claim 13. Claim 14 reads:

> *14. The system of claim 13 including a printer peripheral in communication with a computer, and a printer driver executing in the computer and incorporating the watermark decoder.*

Suzuki is not understood to teach "a printer driver executing in the computer and incorporating the watermark decoder." The Final Rejection states that Suzuki teaches this at col. 11, lines 17-19. In fact, he does not. The quoted lines read:

> *Furthermore, it can be utilized as an additional function for an image scanner or a printer of stand-alone type.*

No reference to a printer driver, in the computer, incorporating the watermark decoder, is found. (Indeed, later in the Action, the Examiner acknowledges, "While the system of Suzuki et al clearly has a CPU, the use of a printer driver to decode a watermark is not discussed."[33])

Again, since Suzuki does not teach that for which it is cited, the anticipation rejection of claim 14 should be reversed.

3. **Claim 15 (§ 102: Suzuki)**

Claim 15 also depends from claim 13 and is similarly allowable. Claim 15 is also patentable independently of claim 13. Claim 15 reads:

> *15. The system of claim 13 including a scanner peripheral in communication with a computer, and a scanner driver executing in the computer and incorporating the watermark decoder.*

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[33] July 28, 2004, Final Rejection, page 10, lines 16-17.

Again, Suzuki is not understood to teach "a scanner driver executing in the computer and incorporating the watermark decoder." The Final Rejection cites the same sentence as quoted above for this limitation. Again, that excerpt does not teach the claimed arrangement.

Again, since Suzuki does not teach that for which it is cited, the anticipation rejection of claim 13 should be reversed.

4. Claim 3 (§ 103: Suzuki + Conley)

Claim 3 is an independent method claim drawn to watermark decoding in a printing or scanning process:

> *3. A method of image watermark decoding in a printing or scanning process comprising:*
> *intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;*
> *performing a watermark decoding operation on at least certain of said portions; and*
> *providing a result of the decoding operation before the printing or scanning process has completed for the image;*
> *wherein the watermark decoding operation is performed in a driver executing in a computer as an image is being passed between an application program and a printer or scanner through the driver.*

The Final rejection of claim 3 states, "Suzuki et al disclose a method of image watermark decoding ..."[34] This is incorrect.

As explained above, and contrary to the just-quoted statement, Suzuki has no teaching concerning "watermark decoding." Rather, Suzuki finds a vacant circular region at the center of a Japanese banknote (where a traditional, paper watermark resides) and – by reference to the position of this vacant area – finds four candidate locations where a red Bank of Japan seal may be found.

Because the obviousness rejection is premised on an erroneous understanding of the principal reference's teachings, it should be reversed.

The rejection is flawed in other respects, too.

The rejection again confuses the red stamp mark found on Japanese banknotes (*i.e.*, the Bank of Japan seal) with the claimed watermark:

> *...the CPU determines 4 likely areas where* ***the red stamp mark (i.e., the watermark)*** *is located.*[35]

The red stamp mark is not a watermark – neither a digital watermark nor a traditional watermark. It is the (different) feature in the middle of the banknote that Suzuki identifies as the watermarked area (see crosshatched area in center of Suzuki's Fig. 1, and col. 8, lines 6-8).

Again, the rejection is premised on an erroneous understanding of the art.

Still further, the proposed combination of Suzuki with Conley does not meet the *prima facie* standard. For example, the Examiner alleges that Conley and Suzuki are "in the same field of endeavor of image watermarking."[36] Not so. Suzuki has nothing to do with image watermarking; his invention concerns interrupting a photocopier upon detection of an image that includes a Bank of Japan seal. (Conley concerns linking one document to another.[37]) Moreover, the rationale explaining why the combination would have been obvious to an artisan rests on hindsight reconstruction rather than any suggestion from the art.

The rejection is ill-founded in other respects, but the foregoing points are believed sufficient to establish the need for reversal.

5. Claim 10 (§ 103: Suzuki + Conley)

Claim 10 is another independent method claim drawn to watermark decoding in a printing or scanning process:

> *10. A method of image watermark decoding in a printing or scanning process comprising:*

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34 July 28, 2004, Final Rejection, page 9, second-to-last line.
35 July 28, 2004, Final Rejection, page 10, lines 4-5.
36 July 28, 2004, Final Rejection, page 10, lines 17-18.
37 *See, e.g.*, Conely at col. 1, lines 8-9.

intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;

performing a watermark decoding operation on at least certain of said portions; and

providing a result of the decoding operation before the printing or scanning process has completed for the image;

wherein the result of the decoding operation is used to trigger an action before printing or scanning of the image is complete; and

wherein the action includes using information in the watermark to index related information about the image in a database.

Again, the Examiner wrongfully states "Suzuki et al discloses a method of image watermark decoding."[38] Again, Suzuki has no such teaching.

Because the obviousness rejection is premised on an erroneous understanding of the principal reference's teachings, it should be reversed.

Again, the rejection is flawed in other respects, too.

The rejection again confuses the red stamp mark found on Japanese banknotes (*i.e.*, the Bank of Japan seal) with the claimed watermark:

...the CPU determines 4 likely areas where ***the red stamp mark (i.e., the watermark)*** *is located.*[39]

Again, the red stamp mark is not a watermark – neither a digital watermark nor a traditional, paper, watermark. It is the (different) feature in the middle of the banknote that Suzuki identifies as the watermarked area (see crosshatched area in center of Suzuki's Fig. 1, and col. 8, lines 6-8).

Again, the rejection is premised on an erroneous understanding of the art.

Still further, the combination of Suzuki and Conley proposed by the Examiner is not adequately justified.

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38 July 28, 2004, Final Rejection, page 11, line 6.

39 July 28, 2004, Final Rejection, page 11, lines 10-11.

Claim 10 requires:

> *wherein the result of the decoding operation is used to trigger an action before printing or scanning of the image is complete; and*
> *wherein the action includes using information in the watermark to index related information about the image in a database.*

The Examiner alleges the former clause (*i.e.*, triggering an action) is met by Suzuki's executing an action to prevent forgery, *i.e.*, stopping printing.[40] The Examiner alleges the latter clause (indexing related information) is met by Conley's teachings.[41] He then proposes combining these disparate teachings.

So doing, however, would defeat Suzuki's aim of interrupting the attempted counterfeiting of banknotes.

The Examiner's rationale for the combination is:

> *It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki et al by using information in the watermark to index related information about the image in a database as taught in Conley because a "minimal amount of space [is used] to link a watermark file to a document... Therefore, a large amount of information can be linked to a document by embedding only a small amount of information in the watermark."*

Again, this is impermissible hindsight reconstruction. A "minimal amount of space" does not explain why an artisan would have been led to disregard Suzuki's teachings about triggering interruption of an apparent counterfeiting operation, and employing teachings from Conley instead.

Again, the rejection should be reversed: the art fails to teach that for which it is cited, and the rationale proposed for the combination does not meet the Examiner's *prima facie* burden.

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[40] July 28, 2004, Final Rejection, page 11, lines 19-20; page 12, lines 1-2.

[41] The Examiner's citation of Conley for this feature is ill-founded. The Final Rejection cites Conley at col. 2, lines 67 – col. 3, line 1, and col. 4, lines 51-53, for this teaching (Final Rejection at page 12, line 8). However, these excerpts instead teach:

> *Thus, the method for linking a watermark file to a document and selecting the watermark file when printing the document preferably occurs before the printer driver renders any object on a page.... The printer driver preferably scans all of the files and does not stop when the first match is found. This step is depicted in block 318.*

6. Claim 4 (§ 103: Suzuki + Conley + Tillery)

Claim 4 depends from claim 3 and is similarly allowable. Claim 4 is also allowable independently of claim 3. Claim 4 reads:

> *4. The method of claim 3 wherein the driver includes 16 bit code, the watermark operation is implemented in 32 bit code, and the watermark operation is invoked from the 16 bit code through an application programming interface of the 32 bit code.*

The new, third, reference – Tillery, concerns the problem arising when a software client obtains the correct interface driver for an installed hardware card, the user thereafter installs a new device (with a different driver), and finally reverts back to the original hardware card.[42]

The Examiner proposed grafting isolated teachings from Tillery onto the combination allegedly suggested by Suzuki + Conley. In so doing he makes at least two mistakes.

First, the Examiner seems to misapprehend the claim arrangement. The driver – which includes 16 bit code – *also performs the watermark decoding operation* (per parent claim 3). The watermark decoding operation is implemented in 32 bit code. Thus, the driver of the claimed arrangement includes some 16 bit code and some 32 bit code. Tillery does not teach such an arrangement.

In Tillery, the contemplated drivers are all homogeneous in their code type, *i.e.*, they are either wholly 16 bit code, or wholly 32 bit code. No hybrid driver – including both 16- and 32-bit code – is contemplated. The boundary between 16-bit code and 32-bit code, in Tillery, is the boundary between the software client and the driver. It is not internal to the driver.

Apart from this mistaken factual basis for the rejection, the Examiner also impermissibly applies his own hindsight. The rationale offered to support the rejection would not have motivated an artisan to the arrangement claimed. The Examiner contend the proposed combination would have been obvious:

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42 Tillery at col. 1, lines 56-65.

> *Because the use of such an interface allows "the drivers [to be] automatically enabled for the proper hardware" Therefore, the use of the interface taught by Tillery, Jr. et al. would allow for the watermarking system to be automatically used on any computer.*[43]

The claimed arrangement does not aim to "allow the watermarking system to be automatically used on any computer." It would not work, for example, in a computer that requires a 32 bit printer driver. The claimed arrangement specifies a printer driver built around 16-bit code. Rather, the claimed arrangement aims to allow 32 bit watermark-decoding code to be included in 16-bit printer driver code.

Again, the rejection should be reversed: the art fails to teach that for which it is cited, and the rationale proposed for the combination does not meet the Examiner's *prima facie* burden.

7. Claim 5 (§ 103: Suzuki + Conley + Tillery)

Claim 5 depends from claim 4 and is similarly allowable. Claim 5 is also allowable independently of claim 4. Claim 5 reads:

> *5. The method of claim 4 wherein the 16 bit code passes image data to the 32 bit code over a 16 to 32 bit bridge, and the bridge includes code enabling the 32 bit code to access data structures in the 16 bit code.*

Again, the claim details an arrangement *within* a 16-bit print driver. Tillery has no such teaching.

Again, the rationale offered to support the combination relies on hindsight, rather than a suggestion in the art.

Again, the rejection should be reversed.

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[43] July 28, 2004, Final Rejection, page 13, lines 12-15.

8. Claim 6 (§ 103: Suzuki + Kofune)

Claim 6 is an independent claim drawn to a method of image watermark decoding. Claim 6 reads:

> *6. A method of image watermark decoding in a printing or scanning process comprising:*
> *intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;*
> *performing a watermark decoding operation on at least certain of said portions, the watermark decoding being operable to decode a watermark that has been embedded redundantly in the image and varies in the image; and*
> *providing a result of the decoding operation before the printing or scanning process has completed for the image;*
> *wherein the portions are buffered, and analyzed to select blocks for watermark detection operations.*

The rejection suffers from failings detailed above in connection with claim 3.

For example, the Action states, "Suzuki discloses a method of image watermark decoding."[44] It does not.

As explained above, Suzuki has no teaching concerning "watermark decoding." Rather, Suzuki finds a vacant circular region at the center of a Japanese banknote (where a traditional, paper watermark resides) and – by reference to the position of this vacant area – finds four candidate locations where a red Bank of Japan seal may be found.

The rejection also, again, confuses the red stamp mark found on Japanese banknotes (*i.e.*, the Bank of Japan seal) with the claimed watermark:

> *...the CPU determines 4 likely areas where **the red stamp mark (i.e., the watermark)** is located.*[45]

Again, the red stamp mark is not a watermark – neither a digital watermark nor a traditional, paper, watermark. It is the (different) feature in the middle of the banknote that

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[44] July 28, 2004, Final Rejection, page 13, line 18.
[45] July 28, 2004, Final Rejection, page 13, line 22 – page 14, line 1 (parentheticals omitted).

Suzuki identifies as the watermarked area (see crosshatched area in center of Suzuki's Fig. 1, and col. 8, lines 6-8).

In view of these erroneous understandings of the art, the rejection is ill-founded and should be reversed.

Additionally, the Examiner has mis-read the secondary reference: Kofune.

Kofune teaches an apparatus for validating banknotes, by comparing patterns characteristic of banknotes (including watermark patterns and magnetic ink patterns) with patterns sensed from input documents.

Again, the watermarks referenced in Kofune are traditional paper watermarks. They are not digital watermarks. Kofune's watermarks can not be "decoded" as required by the claim.

Still further, claim 6 requires that "a watermark" has been "embedded redundantly in the image." Kofune's paper watermarks do not meet such limitation; he shows several *different* watermarks, formed *once each* (Fig. 5A).

Still further, the Action has failed to present a statutorily adequate rationale for picking and choosing elements from Suzuki and Kofune to combine in the manner proposed. The stated rationale relies on hindsight reconstruction, rather than a cognizable suggestion from the art.

In view of the shortcomings noted above, the rejection of claim 6 should be reversed. (Other points that might be made concerning the claim and the art are not belabored, given the evident inadequacy of the rejection.)

9. Claims 8, 9 and 12 (§ 103: Suzuki + Kofune)

Claims 8, 9 and 12 stand or fall with claim 6, from which they depend.

10. Claim 11 (§ 103: Suzuki + Kofune + Rhoads)

Claim 11 depends from claim 8, and is similarly allowable. Claim 11 is also patentable independently of claim 8. Claim 11 reads:

11. The method of claim 8 wherein the action includes using information in the watermark to fetch a web page related to the image.

Rhoads teaches the feature introduced by claim 11, but does so in a field (*digital* watermarking) not addressed by Suzuki or Kofune.

Moreover, the proposed combination again rests on evident hindsight. The Examiner asserts the combination would have been obvious to an artisan because:

> *Such a system allows for a watermark containing a small amount of data to be embedded into an image and then linked to a large amount of data. Therefore, the watermark can be easily embedded into the image due to its relatively small size, and contain a large amount of information, since it is linked to a web page.*

This explanation draws exclusively from the teaching of Rhoads. However, it is entirely divorced from the Suzuki and Kofune art with which Rhoads is to be combined. Nothing in this statement attempts to explain why Rhoads' teachings should be applied to Suzuki's or Kofune's ambitions of recognizing banknotes. There is no reason why an artisan would include web page linking in Suzuki's or Kofune's systems – absent impermissible hindsight.

Again, the rejection should be reversed.

11. Claim 19 (§ 102: Ratnakar)

Claim 19 is an independent claim drawn to a method of image watermark encoding in a printing process. Claim 19 reads:

19. A method of image watermark encoding in a printing process comprising:

intercepting portions of an image as the portions pass from one stage of a printing process to another;

performing a watermark encoding operation on at least certain of said portions, said encoding including encoding calibration data into the image, said calibration data facilitating detection of a watermark in a geometrically distorted version of the watermarked image; and

providing watermarked portions of the image to a subsequent stage in the printing process.

18. A method of image watermark encoding in a printing process comprising:
intercepting portions of an image as the portions pass from one stage of a printing process to another;
performing a watermark encoding operation on at least certain of said portions, said encoding including encoding tracer data into the image in response to detecting a watermark in the image; and
providing watermarked portions of the image to a subsequent stage in the printing process.

As noted, Ratnakar concerns digital watermarking. However, as acknowledged by the Action, Ratnakar "does not teach encoding tracer data." The Examiner cites Stefik for this feature.

Stefik *does* include a relevant passage:

> *Whenever a bookstore prints one of the works (either standalone or embedded in a collection), the fee is credited to the creator automatically. To discourage unauthorized copying of the print outs, it would be possible for the printer to print tracer messages discretely on the pages identifying the printing transaction, the copy number, and any other identifying information. The tracer information could be secretly embedded in the text itself (encoded in the grey scale) or hidden in some other way.*[46]

The rejection fails, however, *e.g.*, because the art does not teach – and because the Examiner ignores – a further claim limitation.

Claim 18 further requires that the encoding of tracer data be performed "in response to detecting a watermark in the image." No such teaching is included in Stefik (nor Ratnakar). Thus, even if the art was combined as proposed, the claimed arrangement would not result.

(Moreover, the Examiner's rationale for combining Stefik with Ratnakar is flawed. The rationale is based on the assertion that Stefik is "in the same field of endeavor of image watermarking."[47] Stefik is not. Stefik is in the field of controlling the distribution and use of digital works.[48] It has no teaching of any digital watermarking technology.)

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46 Stefik at col. 48, lines 17-26.
47 July 28, 2004, Final Rejection, page 17, lines 5-6.

This claim stands rejected as anticipated by Ratnakar. (Unlike Suzuki, Ratnakar concerns digital watermarking.)

While Ratnakar teaches certain aspects of the claim, it fails to teach others.

For example, Ratnakar does not teach "*said encoding including encoding calibration data into the image, said calibration data facilitating detection of a watermark in a geometrically distorted version of the watermarked image.*"

The Examiner cites Ratnakar at col. 9, lines 61-64 for this limitation. However, that excerpt does not teach the claim arrangement. That excerpt (found under the heading ***Reading a Watermark)*** reads:

> *Step 182 selects an image from a search space which is to be examined to determine if a watermark is present. In a preferred embodiment, the search space includes variations for rotation and offset.*

First, it will be recognized that this excerpt does not concern watermark *encoding*. Rather, it concerns the complementary operation: watermark *decoding* (aka watermark "reading").

Moreover, the excerpt is silent about "calibration data." Instead of including such data in the image at the time of watermark encoding (facilitating the later detection of the watermark from a geometrically distorted version of the image), Ratnakar teaches a brute force approach: trying to decode different versions of the watermarked image that result from application of different rotation and offset parameters.

Because Ratnakar fails to teach the arrangement detailed in the claim, the anticipation rejection should be reversed.

12. Claim 18 (§ 103: Ratnakar + Stefik)

Claim 18 is another independent claim drawn to a method of image watermark encoding in a printing process. Claim 18 reads:

In view of such shortcomings, the Action has failed to establish *prima facie* obviousness, and the rejection should be reversed.

13. Claim 7 (§ 112 ¶ 1)

Claim 7 stands rejected under 35 USC § 112, ¶1. The Examiner asserts that "identifying potentially overlapping blocks that are likely to include a watermarks signal" constitutes subject matter essential to the practice of the invention (citing *In re Mayhew*, 527 F.2d 1229 (CCPA 1976)).[49]

The Examiner's rationale for his position (*i.e.*, that the "potentially overlapping" limitation is essential to the invention) is based on *comments* made in applicants' *arguments* urging the patentability of claim 7 during prosecution – *not* from anything in applicants' specification. The *Mayhew* case cited in the Action involved an assessment of essentiality *based on statements in applicants' specification.*

In the present case, the term *overlap* was not mentioned in the Detailed Description. It appeared only in the originally-filed claims. Accordingly, and unlike *Mayhew,* the specification does not compel a finding that the questioned limitation is in any way essential.

Indeed, the specification describes embodiments in which the claimed block analysis does *not* include identifying potentially overlapping blocks (*c.f.* page 5, lines 18-20, which does not refer to the blocks as being overlapping; *see, also,* Fig. 1 at reference numeral 106, where "block 4" overlaps with none other).

Accordingly, the § 112 ¶ 1 rejection of claim 7 is ill-founded and should be reversed. (No art-based rejection of claim 7 has been made.)

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[48] Stefik, title.

[49] The Final Rejection (page 6, paragraph 7) also includes the words "is not enabled by the disclosure" but this allegation is not further referenced, and seems to be a typo.

14. Specification

The Final Action asserts that the incorporation-by-reference of commonly-owned patent 6,614,914 into the present specification is improper, because "essential material may not be incorporated by reference to a US patent which itself incorporates 'essential material' by reference."[50]

The policy cited by the Examiner is understood to be designed to avoid the situation where

- application A incorporates application B, which incorporates application C, which incorporates application D,... which incorporates application Y, which incorporates application Z; wherein
- subject matter disclosed in one of C-Z (and not known to an artisan reading specifications A or B) is essential to A.

The Examiner has not shown that this is the case with the '914 patent. That is, the Examiner has not demonstrated (nor even alleged) that subject matter essential to § 112 support of any of the pending claims is not adequately disclosed in the present specification and in the '914 patent,[51] but rather is supported only by a more remote patent that is incorporated-by-reference into the '914 patent.

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[50] July 28, 2004, Final Rejection, page 5, lines 5-6.

[51] Patent 5,862,260 is also incorporated-by-reference into the present specification; see page 1, line 11.

VIII. CONCLUSION

The rejections under § 102 fail because the art does not teach each of the claims' limitations. The rejections under § 103 fail because the prior art references do not teach claim limitations for which they are cited, and because the Examiner has failed to present a *prima facie* showing that an artisan would have found the proposed combinations to be obvious. The § 112 issues in the Final Rejection are without merit. Accordingly, the Board is requested to reverse the outstanding rejections, and remand to the Examiner for issuance of a notice of allowance.

Respectfully submitted,

Date: January 18, 2005

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APPENDIX A

PENDING CLAIMS

1. (Canceled)

2. (Canceled)

3. A method of image watermark decoding in a printing or scanning process comprising:

intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;

performing a watermark decoding operation on at least certain of said portions; and

providing a result of the decoding operation before the printing or scanning process has completed for the image;

wherein the watermark decoding operation is performed in a driver executing in a computer as an image is being passed between an application program and a printer or scanner through the driver.

4. The method of claim 3 wherein the driver includes 16 bit code, the watermark operation is implemented in 32 bit code, and the watermark operation is invoked from the 16 bit code through an application programming interface of the 32 bit code.

5. The method of claim 4 wherein the 16 bit code passes image data to the 32 bit code over a 16 to 32 bit bridge, and the bridge includes code enabling the 32 bit code to access data structures in the 16 bit code.

6. A method of image watermark decoding in a printing or scanning process comprising:

intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;

performing a watermark decoding operation on at least certain of said portions, the watermark decoding being operable to decode a watermark that has been embedded redundantly in the image and varies in the image; and

providing a result of the decoding operation before the printing or scanning process has completed for the image;

wherein the portions are buffered, and analyzed to select blocks for watermark detection operations.

7. The method of claim 6 wherein the analysis of the blocks in the buffer includes identifying potentially overlapping blocks that are likely to include a watermark signal.

8. The method of claim 6 wherein the result of the decoding operation is used to trigger an action before printing or scanning of the image is complete.

9. The method of claim 8 wherein the action includes stopping the printing or scanning of the image.

10. A method of image watermark decoding in a printing or scanning process comprising:

intercepting portions of an image as the portions pass from one stage of the printing or scanning process to another;

performing a watermark decoding operation on at least certain of said portions; and

providing a result of the decoding operation before the printing or scanning process has completed for the image;

wherein the result of the decoding operation is used to trigger an action before printing or scanning of the image is complete; and

wherein the action includes using information in the watermark to index related information about the image in a database.

11. The method of claim 8 wherein the action includes using information in the watermark to fetch a web page related to the image.

12. A computer readable medium on which is stored software for performing the method of claim 6.

13. An imaging system comprising:

a device for scanning or printing an image;

a digital watermark decoder in communication with said device for intercepting portions of an image as the portions pass from one stage of a printing or scanning process to another, for performing a watermark decoding operation on at least certain of said portions; and for providing a result of the decoding operation before the printing or scanning process has completed, the decoder including a manager for selecting blocks for watermark decoding based on an analysis of characteristics of the blocks indicating which blocks are likely to have a recoverable watermark signal.

14. The system of claim 13 including a printer peripheral in communication with a computer, and a printer driver executing in the computer and incorporating the watermark decoder.

15. The system of claim 13 including a scanner peripheral in communication with a computer, and a scanner driver executing in the computer and incorporating the watermark decoder.

16. (Canceled)

17. (Canceled)

18. A method of image watermark encoding in a printing process comprising:

intercepting portions of an image as the portions pass from one stage of a printing process to another;

performing a watermark encoding operation on at least certain of said portions, said encoding including encoding tracer data into the image in response to detecting a watermark in the image; and

providing watermarked portions of the image to a subsequent stage in the printing process.

19. A method of image watermark encoding in a printing process comprising:

intercepting portions of an image as the portions pass from one stage of a printing process to another;

performing a watermark encoding operation on at least certain of said portions, said encoding including encoding calibration data into the image, said calibration data facilitating detection of a watermark in a geometrically distorted version of the watermarked image; and

providing watermarked portions of the image to a subsequent stage in the printing process.

20. (Canceled)